# THE EARTH SPEAKS TO BRYAN

## BY THE SAME AUTHOR

THE EARTH SPEAKS TO BRYAN

IMPRESSIONS OF GREAT NATURALISTS

MEN OF THE OLD STONE AGE

THE ORIGIN AND EVOLUTION OF LIFE

THE AGE OF MAMMALS

EVOLUTION OF MAMMALIAN MOLAR TEETH

FROM THE GREEKS TO DARWIN

EVOLUTION AND RELIGION

HUXLEY AND EDUCATION

# THE EARTH SPEAKS TO BRYAN

BY

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Second Edition

TO

JOHN THOMAS SCOPES

COURAGEOUS TEACHER

WHO ELECTED TO FACE SQUARELY THE ISSUE THAT
THE YOUTH OF THE STATE OF TENNESSEE SHOULD BE
FREELY TAUGHT THE TRUTHS OF NATURE AND THE FACT
THAT THESE TRUTHS ARE CONSISTENT WITH THE
HIGHEST IDEALS OF RELIGION AND CONDUCT

THE TRUTH
SHALL MAKE YOU FREE

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# THE EARTH SPEAKS TO BRYAN

## THE TENNESSEE TRIAL

*"The heavens declare the glory of God; and the firmament sheweth his handywork."* (Psalm 19 : 1.)

THERE is a wide difference of opinion in the United States, and even in other parts of the civilized world, about the Tennessee trial. Most people express themselves as strongly opposed to it. I for one am strongly in favor of it, and I am confident that it will clear the atmosphere, as in the past great historic trials of a similar character have done.

Fortunately, we have reached a stage of civilization where there is no question of burning at the stake, as with Giordano Bruno, or of imprisonment, as with Galileo when he declared that the earth revolved around the sun and that the sun itself was in motion. In the Tennessee case even the distinguished plaintiff declares that the defendant will lose only his living; he will not be thrown into prison, he will not be excommunicated, he certainly

will not be burned at the stake. Beginning in 1593, Giordano Bruno was imprisoned for seven years, and on February 17, 1600, was burned at the stake for firmly holding to his chief maxim that "the investigation of Nature in the unbiased light of reason is our only guide to truth." Beginning June 24, 1633, Galileo Galilei, at the age of seventy, was imprisoned and later kept in close confinement for adhering to his theory of the motions of the earth and of the sun as against the orthodox astronomical teaching of his times.

The reason I am in favor of this trial is that I take a view entirely different from that of most of my fellow citizens as to who is really on trial, as to which is the plaintiff and which the defendant in the case. The facts in this great case are that William Jennings Bryan is the man on trial; John Thomas Scopes is not the man on trial. If the case is properly set before the jury, Scopes will be the real plaintiff, Bryan will be the real defendant.

The brief in this case was best phrased by Bryan himself with his usual terseness and clearness when he opened this discussion in

one of the great American newspapers in the year of our Lord 1922:

"*The Real Question Is, Did God Use Evolution as His Plan?*"

This is the supreme issue which the Tennessee court and the judge and jury will have to pass upon. All the other issues, such as personal rights, rights of opinion, rights of free speech, constitutional rights, educational liberty, which will undoubtedly be brought into the case by the counsel on both sides and which may for a time befuddle the minds of the jurors, are mere temporary side issues and will fade into insignificance in comparison with the supreme issue. If Scopes has been teaching the truth to his students he will win; if he has been teaching untruths he will lose, and will deserve to lose. I am a great believer in educational liberty, but I do not believe that any teacher, high or low, should pass off his personal opinions on the tender minds of students; he is at liberty only to teach truths which are well and soundly established. In this case the evolution of higher and of lower

forms of life is as well and as soundly established as the eternal hills. *It has long since ceased to be a theory; it is a law of Nature as universal in living things as is the law of gravitation in material things and in the motions of the heavenly spheres.*

If Bryan and his learned counsel can prove that God did *not* use evolution as His plan they will deserve our gratitude, and William Jennings Bryan will come out of the court one of the saviors of American youth; if, on the other hand, the affirmative decision is reached and it is shown by the learned counsel for the defense that God *did* use evolution as His plan, then John Thomas Scopes will walk out of court a free man, the governor and legislature of the State of Tennessee will convene to revise their recent legislation, and William Jennings Bryan will suffer a greater defeat than any he has had at the polls. Not only will Scopes be free, but Truth will be free, and the truths of Nature as distinguished from the transitory opinions of either scientist or theologian will be freely taught to the youth of our nation.

the remote and humble ancestors of that great race which we ourselves have honored with the name of *Primates* because all the members of this race, like ourselves, live upon their wits, relying upon their cleverness and even intelligence in the eternal struggle for existence. In clarion tones, not with uncertain sound, the earth tells us in both the form and the functions of our bodies and of our minds, in every nerve, in every gland, in every muscle which the nerves control, in the lower and higher centres of the brain as the royal seat of our primacy, in the bones which compose our framework, especially in the bones of the skull and jaws and of the foot and hand, that we too have ascended from lowlier ancestors not wholly dissimilar but never identical with other *Primates* to which we feel ourselves proudly superior. Let us regard them as "poor relations" if we will, they are none the less of the same handiwork as ourselves.

In Darwin's day the earth had hardly begun to speak of this relationship of ours to the other *Primates*, but Darwin's was the prophet's ear, close to the earth, which truly

interpreted its feeble tones. To-day the earth speaks with resonance and clearness, and every ear in every civilized country of the world is attuned to its wonderful message of the creative evolution of man, except the ear of William Jennings Bryan; he alone remains stone-deaf, he alone by his own resounding voice drowns the eternal speech of Nature.

How can I as the author of these essays, a naturalist, a professor of zoology, "a tall professor coming down out of the trees," as he calls me, contend with the resounding voice of Bryan when the voices of Nature are powerless to do so? At once I confess that I cannot contend with him, nor can I still his voice, and this has always been my attitude since February, 1922, when in reply to his article in the New York *Times* entitled "Evolution of Man," I hastily wrote the first of my rejoinders, "Evolution and Religion," and thus entered the arena of Religion and Science in which the Great Commoner and myself have met at intervals during the past three years. My advice to my opponent is invariably and consistently the same; namely, to

drop the methods of the lawyer, of the politician, of the statesman, even of the theologian and of the scientist, and to adopt the simple methods of the naturalist, to observe and hear for himself the great truths which the earth so clearly proclaims.

I do not enter into the well-known details of the wonderful processes of evolution as they have been conscientiously observed in plants and animals for a century and a half. I refer inquirers after truth to the published and readily accessible works of a long line of observers, from Leonardo da Vinci in the fifteenth century to the writers of the eleventh edition of the Encyclopædia Britannica.

As for the creative evolution of man, passing by the early speculative writings of such men as Haeckel, we now have more than a dozen substantial volumes based not upon guesswork or speculation but upon the testimony yielded in the superficial layers of the earth and in caves, embracing hundreds of specimens of the fossilized remains of man, more or less ancient, more or less complete, but invariably, without a single exception,

testifying to the gradual *ascent of man* from a lower to a higher state, gradually dropping one primitive bit of anatomy after another until the high, intelligent, fully human aspect is attained.

Again with clarion voice these irrefutable witnesses of our past positively demonstrate two new and somewhat unexpected truths: first, that *man has not descended from any known kind of monkey or ape*, fossil or recent; with this truth, established not by Bryan but by the testimony of the earth, one of the chief sentimental objections to the creative evolution of man disappears forever. Second, *man has a long, independent, superior line of ascent of his own*, with a relatively erect posture, with hands free to grasp and use tools, with the thumb and forefinger capable of handling flint implements such as the graving tools and brush of the artist and, finally, the reed, pen, or crayon, with which to set down his thoughts. Challenge as we may the less perfect fossil discoveries in the Trinil sands, in the Piltdown gravels, in the Heidelberg riverbeds, no man can challenge the convincing

testimony to the creative evolution of man afforded by the several complete skeletons of the race of the Neanderthal who lived 100,000 years ago, nor the perfectly preserved fossil remains of the artistic race of the Crô-Magnons who lived 30,000 years ago.

The Neanderthal hunters of 100,000 years ago and the Crô-Magnon artists of 30,000 years ago are not guesswork or the fabric of scientific imagination; they are realities, men like ourselves, the older one a much lower race—a veritable missing link—the other a higher race with all powers equal to our own.

At the time these fossilized artists of the higher Crô-Magnon race lived along the river borders of France all of northern Europe was sinking under the burden of the titanic glacier which covered Belgium and northern France and which drove southward great herds of the reindeer, the woolly rhinoceros, the Arctic hares and lemmings. These artists painted and modelled in clay and rock the fossilized mammoths, and no circumstantial evidence produced in court at any time in the whole history of law has ever been stronger

than this evidence that these artists, these reindeer, and these mammoths lived together in the subarctic climate of southern France and northern Spain.

The low-browed Neanderthal hunting race is of far greater antiquity, a fact also established by circumstantial evidence equally strong and equally convincing. When these men hunted the woolly rhinoceros in the half-frozen rivers of southern France the titanic glaciers of the northern hemisphere reached their arms southward from the Scandinavian peaks and from the central and eastern (Laurentian) highlands of Canada, attaining such height and massiveness as to completely bury the entire State of New York, finally reaching their melting-point near the western extremity of Long Island and the centre of the State of New Jersey. This fossilized hunting race of the Neanderthals, low-browed, small-statured, ungainly, hideous of aspect, with retreating chin, broad nostrils, beetling eyebrows, is nevertheless human, beyond challenge. They had tender sentiments, they revered their dead, they believed in the future existence of

the hunter in "happy hunting-grounds," as evidenced in their inclusion of the finest flint implements in the burial of their dead.

To sum up the testimony of the rocks, the evidence as regards the creative evolution of man is as unanswerable as that of the creative evolution of the entire plant and animal world. Man is no exception to the universal law that God did use evolution as His plan.

### THE STILL SMALL VOICE

*"And he said, Go forth, and stand upon the mount before the Lord. And, behold, the Lord passed by, and a great and strong wind rent the mountains, and brake in pieces the rocks before the Lord; but the Lord was not in the wind: and after the wind an earthquake; but the Lord was not in the earthquake:*

*"And after the earthquake a fire; but the Lord was not in the fire: and after the fire a still small voice."* (I Kings 19: 11, 12.)

Does Evolution still the voice of conscience? Does it rob us of our religion? Does it undermine our morals? If taught in the schools and colleges as Nature teaches it, will it undermine the spiritual and moral foundations and ideals of our youth, upon which our future American civilization depends?

This is the contention of Bryan and of the millions of people whom he has deceived by his eloquent references to the Bible as the source of scientific as well as of religious truth. On this side of the case I find myself in sympathy with much of Bryan's teaching and preaching. I agree with many of his moral conclusions, I totally disagree with his premises. Our points of agreement may be clearly set forth as follows: we both believe in the Bible and in its supreme value in moral and religious instruction; we both believe in Christianity and in the principles of conduct set forth in the Sermon on the Mount; we both believe that in the future of our country we must retain the faith of our fathers in the providence of God.

Our points of disagreement, so far as I understand the Great Commoner, are chiefly as follows:

| Bryan Believes | Osborn Believes |
| --- | --- |
| that the Bible is the infallible source of natural as well as spiritual knowledge | that the Bible is an infallible source of spiritual and moral knowledge |

| BRYAN BELIEVES | OSBORN BELIEVES |
| --- | --- |
| that the entire universe was suddenly created in 144 hours, according to literal interpretation of the first chapter of Genesis | that our entire universe and the universes beyond our own represent an incalculably long period of development to their present form |
| that on the sixth day man in the fulness of his powers was suddenly created, according to Genesis 1:27: So God created man in his own image, in the image of God created he him; male and female created he them. | that the life of our planet represents an incalculably long period of creative evolution which was crowned with the ascent of man; that man approaches the divine through a gradual development of his spiritual, moral, and intellectual faculties. |

It is not possible to express in human language, in human conceptions, or even in human imagination the majestic processes of the universe, nor is it possible to interpret all the causes of the creative evolution of man.

Neither is this the moment to discuss more than the remaining point at issue: Does the idea of creative evolution tend to elevate or to degrade man? This issue has also been the work of ages of philosophy, going back to the early stages of human thought, certainly as far back as 600 B. C.

As I point out in Chapter II, the Christian

Fathers considered this very question with consummate ability. As I attempt to show in Chapter IV, a true conception of evolution compels us to adopt the highest ideals of conduct. Finally, I attempt to show in Chapter V that, apart from the spiritual guidance of the Bible, Nature has been regarded from the earliest times as the work of God, full of moral beauty, truth, and splendor.

## II

## EVOLUTION AND RELIGION

*"The real question is, Did God use evolution as His plan? If it could be shown that man, instead of being made in the image of God, is a development of beasts we would have to accept it, regardless of its effect, for truth is truth and must prevail. But when there is no proof we have a right to consider the effect of the acceptance of an unsupported hypothesis."*—WILLIAM JENNINGS BRYAN, *New York Times, Sunday, February 26, 1922.*

I APPRECIATE the invitation of *The Times* to present the state of our knowledge today regarding Darwinism and the evolution of man, especially in relation to religion, the Bible, and the all-important question of the moral education of our youth. Thousands of good people throughout this country who love the Bible of their fathers and are full of religious faith have been deeply affected by the eloquent and sincere addresses which the Great Commoner has been delivering. Large audiences have listened to him in all parts of the Union with deep interest, and on the members

of the Kentucky legislature he made so profound an impression that this body by only a very narrow vote missed the exclusion of evolutionary teaching in all the schools of the State.

As evidence of Mr. Bryan's sincerity, I have purposely quoted above the sentence which I consider the crux of his whole address, namely: "The real question is, Did God use evolution as His plan? If it could be shown that man, instead of being made in the image of God, is a development of beasts we would have to accept it, regardless of its effect, for truth is truth and must prevail." I interpret this sentence as meaning that he is open to conviction, even if convinced against his will. I am deeply impressed with the fact that he has familiarized himself with many of the debatable points in Darwin's opinions, such as the theory of Sexual Selection, and it is not at all surprising, not being a specialist in biology, that he is extremely confused—as, in fact, many evolutionists are—by the radical differences of opinion as to the power of Natural Selection itself expressed by recent writers such as John Bur-

roughs and Professor Bateson. If it is difficult for biologists to think straight on this very intricate subject of evolution, how much more difficult must it be for the layman? I have elsewhere shown in a recent number of *Science* that Bateson is living the life of a scientific specialist, out of the main current of biological discovery, and that his opinion that we have failed to discover the origin of species is valueless and directly contrary to the truth.

I have not yet had time to answer John Burroughs's wholly misleading article on "Natural Selection" in *The Atlantic Monthly*, but I would like to state positively, as a result of twenty-one years of a single research for the United States Geological Survey, that in my opinion Natural Selection is the only cause of evolution which has thus far been discovered and demonstrated. I believe there are many other causes which remain to be discovered. Mr. Bryan, who is an experienced politician, and who has known politicians to disagree, should not be surprised or misled when naturalists disagree in matters of opinion. No living naturalist, however, so far as I know, dif-

fers as to the immutable truth of evolution in the sense of the continuous fitness of plants and animals to their environment, and the ascent of all the extinct and existing forms of life, including man, from an original and single cellular state.

There are two aspects of Mr. Bryan's address: one, religious and philosophical, on which I may first comment, the other, natural, or coming within the field of direct observation, namely, the origin of species and the origin of man. The former affects our religious beliefs or ideas of God and His relation to Nature; the latter is simply a matter of direct observation of the testimony of the earth; the former will always be debatable and largely a matter of personal faith or of scepticism; the latter is a matter of the laboratory, of the field naturalist, of indefatigable digging in all parts of the world among the ancient archives of the earth's history. If Mr. Bryan, with an open heart and mind, would drop all his books and all the disputations among the doctors and study first-hand the simple archives of Nature, all his doubts would disappear; he

would not lose his religion; *he would become an evolutionist.*

## 'Truth Is Truth and Must Prevail"

These words constitute the solid rock on which enduring religion and the only enduring knowledge of Nature rest, while the shifting sands of human opinion are swept hither and thither both in theology and in science. Wrecked on these sands of opinion are many great names, both in theology and in science, but fortunately there have lived some wise pilots of Nature who would have kept our thinking straight if we had heeded their counsel. I had the good fortune to fall under the influence of James McCosh, natural philosopher and divine, who in his lectures on "Christianity and Positivism" accepted evolution, with most of its implications, in the year 1876.

Thirteen years earlier, in 1863, Charles Kingsley, whose religion no one has ever challenged, struck the note of truth only four years after Darwin's "Origin of Species" appeared, when he wrote to Frederick Maurice, one of

the most profoundly religious men that England has produced: "Darwin is conquering everywhere, and rushing in like a flood, by the mere force of truth and fact. The one or two who hold out [against Darwin] are forced to try all sorts of subterfuges as to fact, or else by evoking the *odium theologicum*." In the same letter Kingsley says: "The state of the scientific mind is most curious; . . . they find that now they have got rid of an interfering God—a master-magician, as I call it—they have to choose between the absolute empire of accident, and a living, immanent, ever-working God."

Kingsley describes himself as "busy working out points of natural theology, by the strange light of Huxley, Darwin, and Lyell. I think I shall come to something worth having before I have done." Although in the van of the religious thinkers of his time, Kingsley was not in a position to answer Mr. Bryan's main question: "Did God use evolution as His plan?" Evolution in 1863 rested on the indirect or circumstantial evidence presented by Darwin, while in 1922 it *is the most firmly*

*established truth in the natural universe* and, in Mr. Bryan's language, we shall have to accept it regardless of its effect. Let us, therefore, glance at some of the effects.

I am not writing to convince evolutionists, I am writing to convince Mr. Bryan himself and his many followers. That you may avoid all religious doubts and difficulties, first accept as the foundation of your faith the creed which runs through the Old and New Testaments alike and is best expressed in the grand old Latin phrase, "Pleni sunt cœli et terra gloria tua." Without this creed, you may be an atheist or an agnostic. With this creed you are in a secure citadel of faith, and when discovery after discovery impels you to surrender the preconceptions of man in his ignorance as to Joshua's belief that the sun moved around the earth, as to the flatness of the earth, as to the universe being formed in six days of twenty-four hours, as to all the millions of species of animals and plants being made within four days, as to man being made in the image of God in one day, as to woman being made out of the rib of man,

you remain serene, because you humbly accept the universe and man as God willed them. You may be convinced that your misgivings and prejudices against Nature will all be resolved, if you simply repeat to yourself: I accept Nature as God made it; truth is truth and must prevail.

Nothing should be more clearly or more emphatically taught to our youth than that the Bible is the story of the spiritual and moral progress of man, in less degree his intellectual progress—in these senses a perpetual source of inspiration, of religious consolation, and the most permanent foundation of conduct. We naturalists accept as transcendent the teaching that the universe is by no means the result of accident or chance, but of an omnipresent beauty and order, attributed in the Old Testament to Jehovah, in our language to God. Evolution by no means takes God out of the universe, as Mr. Bryan supposes, but it greatly increases both the wonder, the mystery, and the marvellous order which we call "Natural Law," pervading all Nature.

No child should be taught that the Bible

tells the story of Nature as it has been revealed to us through two thousand years of observation, and especially during the last one hundred years. There was no curiosity about Nature among the writers of the Bible, as there is little natural curiosity among Orientals today. It was not until the Book of Job was written, about 450 B. C., that we find the guiding precept of the naturalist: "Speak to the earth and it shall teach thee." When Mr. Bryan observes that evolution finds "no support in the Bible," he is absolutely right; just as he is absolutely wrong when he maintains that evolution ends in atheism. On this point I know I shall not convince him if I quote any scientific authority, but I feel that I may direct Mr. Bryan's attention to a writer whom he has evidently not studied; namely, the great theologian of the fifth century, St. Augustine, 354–430 A. D. I may quote St. Augustine as to the wisdom of leaving Nature to the naturalists:

> It very often happens that there is some question as to the earth or the sky, or the other elements of this world . . . respecting which one who

is not a Christian has knowledge derived from most certain reasoning or observation, and it is very disgraceful and mischievous and of all things to be carefully avoided, that a Christian speaking of such matters as being according to the Christian Scriptures, should be heard by an unbeliever talking such nonsense that the unbeliever perceiving him to be as wide from the mark as east from west, can hardly restrain himself from laughing.

To Augustine also Mr. Bryan may be referred for a sound and thoroughly modern theistic conception of evolution. Augustine held that all development takes its natural course through the powers imparted to matter by the Creator; even the bodily structure of man himself is according to this plan, and therefore a product of this natural development; he taught that in the institution of Nature we should not look for miracles, but for the laws of Nature; he distinctly rejected the Mosaic idea of the six-day creation in favor of the teaching which, without violence to language, we may call a theory of evolution: that all things developed by causal energy and potency, not only the heavens, but also those living things which the waters and the earth

produced, so that in due time, after long delays, they developed into their perfected forms.

We may now leave this metaphysical part of the subject and return to the evidence that evolution was the plan and the only plan of Nature, that all species of animals and plants originated in this way, that man has ascended from the ranks of Nature. There was a time when man considered himself greatly superior to the animal kingdom; in fact, the Psalmist exalts him, giving him dominion over the whole earth; but since 1914, when the World War began, man has become more humble, he is not quite so confident of his superiority over the rest of God's creation.

The mode of origin of species was practically discovered in 1869 by a little-known German paleontologist by the name of Waagen, but, like the great discovery of Mendel in heredity, this truth has been long in making its way, even among biologists. Waagen's observation that species do not originate by chance or by accident, as Darwin at one time supposed, but through a continuous and well-ordered process, has since been confirmed by an overwhelming

volume of testimony, so that we are now able to assemble and place in order line after line of animals in their true evolutionary succession, extending, in the case of what I have called the edition de luxe of the horses, over millions of years.

We speak to the earth from Eocene times onward to the closing age of man, and it always teaches us exactly the same story. These facts are so well known and make up such an army of evidence that they form the chief foundation of the statement that evolution has long since passed out of the domain of hypothesis and theory, to which Mr. Bryan refers, into the domain of natural law. Evolution takes its place with the gravitation law of Newton. It should be taught in our schools simply as Nature speaks to us about it, and entirely separated from the opinions, materialistic or theistic, which have clustered about it.

This is my answer to Mr. Bryan's very natural solicitude about the influence of evolution in our schools and colleges—a solicitude not inherent in the subject itself, but in the foolishness and conceit of certain of the teachers who

are privileged to teach of the processes of life.

It would not be true to say that the evolution of man rests upon evidence as complete as that of the horse, for example, because we have traced man's ancestors back only for a period of 400,000 years, as geologic time was conservatively estimated in 1893 by Secretary Walcott of the Smithsonian Institution, Washington; whereas, we have traced the horse back for a period of 3,000,000 years, according to similar estimates of geologic time.

The very recent discovery of Tertiary man which I have just described in *Natural History* (November–December, 1921), living long before the Ice Age, certainly capable of walking in an erect position, having a hand and a foot fashioned like our own, also a brain of sufficient intelligence to fashion many different kinds of implements, to make a fire, to make flint tools which may have been used for the dressing of hides as clothing, constitutes the most convincing answer to Mr. Bryan's call for more evidence. It once more reminds us of the ignorance of man of the processes of Nature, and sets a new boundary

beyond which digging in the earth for more of truth must be directed. This Foxhall man, found near Ipswich, England, thus far known only by the flint implements he made and his fire, is the last bit of evidence in the direction of giving man a descent line of his own far back in geologic time. It tends to remove man still farther from the great lines which led to the man-apes, the chimpanzee, the orang, the gorilla, and the gibbon. This is not guesswork, this is a fact. It is another truth which we shall have to accept regardless of its effect. No naturalist has ever ventured to place man so far back in geologic time as this actual discovery of the Foxhall man places him. In this instance again truth is stranger than hypothesis or speculation.

Nearer to us is the Piltdown man, found not far from seventy-five miles to the southwest of Ipswich, England; still nearer in geologic time is the Heidelberg man, found on the Neckar River; still nearer is the Neanderthal man, whom we now know all about—his frame, his head form, his industries, his ceremonial burial of the dead, his belief in

a future existence; nearer still is the Crô-Magnon man, who lived about 30,000 years ago, our equal if not our superior in intelligence. This chain of human ancestors was totally unknown to Darwin. He could not have even dreamed of such a flood of proof and truth. It is a dramatic circumstance that Darwin had within his reach the head of the Neanderthal man without realizing that it constituted the "missing link" between man and the lower order of creation. All this evidence is to-day within reach of every schoolboy. It is at the service of Mr. Bryan. It will, we are convinced, satisfactorily answer in the negative his question: "Is it not more rational to believe in the creation of man by separate act of God than to believe in evolution without a particle of evidence?"

Let us accept the Bryan dictum: *Truth is truth and must prevail.* Truth is not in our minds; we must seek it in Nature and in Religion and keep on seeking until we find the whole truth and nothing but the truth.

## III

## A NEW INQUISITION

*"The real question is, Did God use evolution as His plan? If it could be shown that man, instead of being made in the image of God, is a development of beasts we would have to accept it, regardless of its effect, for truth is truth and must prevail. But when there is no proof we have a right to consider the effect of the acceptance of an unsupported hypothesis."*

THREE years ago William Jennings Bryan made a pledge which he has not fulfilled. This pledge was published on the Lord's Day, February 26, 1922, and was read by a million people. It was so sincere in tone and was accompanied by so earnest a statement that I for one took it at its face value and, trusting that the pledge would be kept, published on the following Sunday, March 5, a solemn reply entitled "Evolution and Religion."

I call attention to the character of this pledge: *Truth is Truth and must Prevail.* Many of my scientific friends ask me: "Why answer Bryan?" I reply that to me Bryan is

not an individual; he is a type. He presents the Gospel to thousands of Americans all over the land who are convinced by his sermons that there is some antagonism between the Creator and His Creation, between God and Nature.

Bryan's gospel is not a truth; it is an ill-starred state of opinion, disastrous to true religion, disastrous to morals, disastrous to education. As recently as January 30, 1925, we read in the daily paper:

TENNESSEE LIKES BRYAN

ANTI-EVOLUTIONISTS PASS BILL BARRING THEORIES IN SCHOOLS

Nashville, Tenn., Jan. 28.—The lower house of the Tennessee General Assembly, voting 71 to 5, passed a bill prohibiting the teaching of evolution in the common schools.

The actual effect of this bill is the declaration by the legislature of one of our oldest and finest States that the Truth must not be taught in the schools of the State. Since 500 B. C. such legislation has repeatedly come from ecclesiastical assemblies and from in-

quisitorial chambers but never before in the history of mankind from a legislative assembly such as that of the State of Tennessee. That such an inquisition should arise in the United States is almost incredible; that teachers in the schools of Tennessee should be compelled to deny the truths taught by Nature or lose their means of livelihood puts the State back exactly four centuries to the inquisitorial period of Spanish history.

Let us commend to these new inquisitors, misled by Bryan, the enlightened words of Canon H. de Dorlodot, D.D., D.Sc., delegate from the Catholic University of Louvain, Belgium, on the occasion of the Darwinian Centenary at Cambridge:

> It is no exaggeration to say that, in showing us a creation more grandiose than we had ever suspected it, Charles Darwin completed the work of Isaac Newton; because, for all those whose ears are not incapable of hearing, Darwin was the interpreter of the organic world, just as Newton was the voice from heaven come to tell us of the glory of the Creator, and to proclaim that the universe is a work truly worthy of His hand. And of these two illustrious interpreters of nature,

who were nurtured by your glorious university, it is permissible to say with the psalmist:

"*There is no speech nor language, where their voice is not heard.*
*Their line is gone out through all the earth, and their words to the end of the world.*"
—Canon de Dorlodot: "Darwinism and Catholic Thought," p. 177.

Inasmuch as there can be no antagonism between the Creator and His Creation, denial of the truths of Nature is atheism disguised as religion. It is an extremely ancient form of atheism, of which we have written records as far back as five centuries B. C. These records we find in the two greatest epics of human suffering—the Book of Job and the "Prometheus Bound" of Æschylus.

The Book of Job, dating back to 450 B. C., is contemporary with "Prometheus Bound" of the years between 467 and 458 B. C. Job contains the reflections of the earliest Hebrew or Semitic writer on the relations of God to Nature, of Nature to Man. While earlier books of the Bible, from those of Moses, 1300–1200 B. C., to the Psalms, which were col-

lected, edited, and in large part composed between 520 and 150 B. C., are full of the inspiration and glory of Nature, Job is the first to enjoin the scientific study of Nature. He presses his admonitions by a long and eloquent survey of the wonders of the earth, of the sea, and of the heavens, which baffle human understanding; he finds the universe full of order, of perfect adaptation to environment, and of beauty, full of lessons and teachings to man. Bildad combats Job's idea of the perfection of creation and declares that the Creator is so superior to His handiwork that even "the stars are not pure in His sight" (Job 25 : 5) !

God rebukes both Bildad and Job and declares that Nature is the direct expression of His power and wisdom. In this declaration and in the Psalms are the foundations of true theism and true religion. Our moral and spiritual nature is strengthened, not weakened, by the spiritual and moral struggle for existence.

In our perpetual search for Truth we may remind the Bildads and the Bryans of the world of the rebuke of the Lord: "Then the

Lord answered Job out of the whirlwind, and said: Who is this that darkeneth counsel by words without knowledge? (38:1, 2). . . . Shall he that contendeth with the Almighty instruct him? He that reproveth God, let him answer it (40:2)"; and of Job's penitence: "Who is he that hideth counsel without knowledge? therefore have I uttered that I understood not; things too wonderful for me, which I knew not (42:2, 3)."

The spirit of scientific inquiry seems to have pervaded the atmosphere 500 B. C.; it was doubtless a subject of discussion among intellectual lights all around the Mediterranean. Also in the atmosphere, in the supposed interest of religion, was the spirit of repression of scientific inquiry. In Greece at the time, inquiry into the truths of Nature was regarded as atheistic and therefore punishable by the gods. Undoubtedly William Jennings Bryan had his prototypes 500 B. C., who through oratory and an appeal to an offended Olympus made the way of questioning the earth very difficult. The whole essence of "Prometheus Bound" is the dire punish-

ment of Prometheus for having dared to promote the welfare of man through the scientific exploration of the earth. Prometheus is the personification of inquiry into the laws of Nature for the welfare of man. After a glorious recital of the rise of man through discoveries in astronomy, in architecture, in mining, in medicine, Prometheus places foremost the gift to man of reason:

*The miseries of men*
*I will recount you, how, mere babes before,*
*With reason I endowed them and with mind:*
*And not in their disparagement I speak,*
*But of my gifts to memorize the love:*
*Who, firstly, seeing, knew not what they saw,*
*And hearing did not hear; confusedly passed*
*Their life-days, lingeringly, like shapes in dreams,*
*Without an aim; and neither sunward homes,*
*Brick-woven, nor skill of carpentry, they knew;*
*But lived, like small ants shaken with a breath,*
*In sunless caves a burrowing buried life:*
*Of winter's coming no sure sign had they,*
*Nor of the advent of the flowery spring,*
*Of fruitful summer none: so fared through each,*
*And took no thought, till that the hidden lore*
*Of rising stars and setting I unveiled.*

—Æschylus: "Prometheus Bound." Translation by Robert Whitelaw. 1907.

In my reply to Bryan I quoted a verse from the Book of Job that has always impressed me: *Speak to the earth and it shall teach thee* (Job 12:8). This admonition of the great Shemite and the lofty humanitarianism of Æschylus direct our attention to the fact that Nature has been speaking since the dawn of humanity in no uncertain tones to those minds and hearts which are open to its voice. It may be in the earth, it may be in the wind, it may be in the earthquake, it may be in the fire, or it may be only in the "still small voice"; it may be serious, solemn, awe-inspiring, and difficult to comprehend, like recent marvellous discoveries in physics and astronomy; it may be small and apparently insignificant, while actually profoundly important and significant, like many of the discoveries in anthropology. To those serious and earnest seekers after the Truth, from 500 B. C. to the present time, we have the contrasting attitude of the Great Commoner; if all the evidence for the Truth were piled as high as Ossa upon Pelion, if proof were heaped upon proof, the Truth would not prevail with him, be-

cause all the natural avenues of the Truth are tightly closed.

It is noteworthy that shortly after his pledge to accept the Truth appeared in 1922, the Earth spoke to Bryan and spoke from his own native State of Nebraska, in the message of a diminutive tooth, the herald of our knowledge of anthropoid apes in America. This *Hesperopithecus* tooth is like the "still small voice"; its sound is by no means easy to hear. Like the hieroglyphics of Egypt, it requires a Rosetta Stone to give the key to interpretation. Our Rosetta Stone is comparison with all the similar grinding teeth known, collected from all parts of the world, and described or figured in learned books and illustrations. By these means this little tooth speaks volumes of truth—truth consistent with all we have known before, with all that we have found elsewhere.

It happens that teeth, incased in enamel, the most enduring animal substance in the whole order of living Nature, defy all the vicissitudes of time and of subterranean burial and take first rank among Nature's hiero-

glyphics of the past. I once travelled several thousand miles to see a single tooth, known to science as *Microlestes antiquus*, signifying "the ancient little robber." Despite its "rhætic" age, surpassing the hoary antiquity of Jurassic time, this tiny tooth, no larger than a pin-head, is shown with its ancient enamel lustre and truthfully tells an unvarnished tale of the life conditions of an epoch in which the "ancient little robber" flourished. Some years afterward, while dining with the Right Reverend William Manning, then rector of Trinity Church, I sat next the Archbishop of York, the Most Reverend Cosmo Gordon Lang. Knowing the Englishman's aversion to commonplaces like the weather and politics, I at once broached the subject of *Microlestes*. I said: "Your Grace, do you know why York is so famous?" He smiled and replied that he supposed it was because of the beauty of its cathedral. "No," I answered, "it is because it houses the oldest tooth in the world!" He confessed that he had never seen this tooth but would certainly on his return to York repair to the museum for the purpose. This

odontological introduction led us genially to the subject of Theodore Roosevelt and his Romanes Lecture in Oxford, as I have narrated elsewhere.

The world-wide interest aroused by the discovery in Nebraska of *Hesperopithecus*, "the ape of the Western world," is in widest possible contrast to the diminutive and insignificant appearance of the single grinding tooth of the right side of the upper jaw, which speaks of the presence of the higher or manlike apes in our Western country at a time when the ancient "Territory of Nebraska" was in close touch with the animal civilization of Asia and of western Europe. The evidence of the tooth is strongly supported by many other and more complete fossil specimens that speak of a fresh tide of migration from the Old World to the New perhaps a million years ago, including antelopes, rhinoceroses, and peculiar Asiatic types of horses.

So it has been with every other great discovery bearing directly or indirectly upon the great question of the origin and evolution of man. The earth has buried its secrets as

if it were reluctant to reveal the history of our past.

What shall we do with the Nebraska tooth? Shall we destroy it because it jars our long preconceived notion that the family of man-like apes never reached the Western world, or shall we endeavor to interpret it, to discover its real relationship to the apes of Asia and of the more remote Africa? Or shall we continue our excavations, difficult and baffling as they are, in the confident hope, inspired by the admonition of Job, that if we keep on speaking to the earth we shall in time have a more audible and distinct reply? Certainly we shall not banish this bit of truth because it does not fit in with our preconceived notions and because at present it constitutes infinitesimal but irrefutable evidence that the man-apes wandered over from Asia into North America.

Moreover, the mystery surrounding the discovery of *Hesperopithecus* is hardly greater than those which have been surmounted in the prehistory of man elsewhere—in Spain, in Britain, in France, in Germany, in Italy,

in Hungary, in the Island of Java, in the Ordos of Inner Mongolia. Just at the moment when Asia seemed to have lost its time-honored Biblical reputation as the Garden of Eden of the human race, two devout Roman Catholics—the one a distinguished missionary of northern China, Père Emile Licent, the other a distinguished paleontologist, Abbé Pierre Teilhard de Chardin—made an epoch-making discovery of paleolithic man of Aurignacian and Mousterian age in the northern valley of the Yellow River bordering China and southern Mongolia. Flint implements were found in the greatest abundance, fashioned after the superior Aurignacian technic, which indubitably established the presence of a large colony of men in this now arid region of central Asia during the more favorable and humid climate of the closing Ice Age. Skulls and bones of these men have not been found, but their flint industry speaks of an order of intelligence as high as that manifest in the finely formed skulls and foreheads of the Aurignacian men recently disinterred at Solutré, France.

Only a few months before, it had been pro-

claimed by one of the leading American anthropologists, Doctor Ales Hrdlicka, of the United States National Museum, that Europe rather than Asia may have been the cradle of the human race. This proclamation rested on the overwhelming testimony of the presence of fossil man in all parts of western Europe, discoveries dating from the first ancient flint implement found in 1690, and extending over 233 years to the sepulchres of Aurignacian man found in 1923 near Solutré, France.

This discovery of the Old Stone Age in north China is consistent with the discovery of the Neolithic or New Stone Age culture about three years ago in China, as revealed by the Swedish explorer, J. M. Andersson, who has now been called to the University of Stockholm. It is also in accord with the prophecies of W. D. Matthew and of the present writer that the high plateau region of central Asia will prove to be the chief cradle of the human race.

It is upon plateaus and relatively level uplands that human and prehuman life is most exacting and response to stimulus most bene-

ficial. An alert race cannot develop in a forest—a forested country can never be a centre of ascent for man; nor can the higher type of man develop in a lowland river-bottom country with plentiful food and luxuriant vegetation. Mongolia has always been an upland country, through the Age of Mammals and before. It was probably a country only in part forested, mainly open, with exhilarating climate and conditions sufficiently difficult to require healthy exertion in obtaining food-supply. In the uplands of Mongolia conditions of life were apparently ideal for the development of early man, and since all the evidence points to Asia as the place of origin of man, and as Mongolia and Tibet, the top of the world, are the most favorable geographic regions in Asia for such an event, we shall sooner or later find the remote ancestors of man in this section of the country.

This idea may be treated only as an opinion, but it is an opinion sufficiently sound to warrant the extended investigation now going forward, and which is to be continued for the next five years under the leadership of

Roy Chapman Andrews in the hope of finding evidence of primitive man in central Asia.[1]

Man is what he is because he has never had an easy time of it; for at least 500,000 years he has been engaged in an incessant struggle for existence, a struggle in which his intelligence and his moral nature have played a very large part, certainly the predominating part in the higher races of man. The spiritual life of man, as will be more fully pointed out in another article, had its dawn extremely far back in geologic time, and belief in life after death was an early development. Religion, in the sense of belief in a supernatural power or powers, followed later and was accompanied by superstition, magic, and the creation of a priesthood as intermediaries between man and the higher powers.

The primitive spiritual life of man is no

[1] This hope has been realized just as this volume goes to press. In a cable, dated Peking, June 1, 1925, Roy Chapman Andrews announces: "*Great success. Immediately discovered more dinosaur eggs and late Paleolithic* [Old Stone Age] *cultures, corresponding to European Azilian* [Upper Paleolithic Stage] *thousands flints, artifacts. Work just begun.*" This first definite proof of the existence of men of the Old Stone Age on the high Mongolian Plateau, taken together with the discovery of the Old Stone Age Man in northern China, tends to strongly confirm the theory that the high central Asiatic Plateau was one of the chief homes of primitive man.

longer a matter of guesswork and hypothesis, as it was at the close of the nineteenth century when Herbert Spencer and Edward B. Tylor were theorizing upon the origin of religion. Through the religious practices and ceremonials of the existing peoples, the prehistory of religion comes to us in no uncertain tones when we speak to the earth, in stone amulets and charms, in ceremonial burials full of tender human sentiment, in sculptures, paintings, and engravings, in primitive written texts which we some time may be able to decipher. Some of these records go back over 50,000 years, when the custom of burial began; others are of more recent date, belonging to the second cave period.

The truth of the records which the earth reveals is truth of the most imperishable order, and it must prevail. It may inconvenience us, it may disturb us, it may completely upset many of our scientific ideas, it may run counter to our religious views; our duty is not to avoid the consequences of the truth but to face them and overcome them.

## IV

## EVOLUTION AND DAILY LIVING

*All that the old Romans summed up as Virtue in the conduct of life is affected by evolution. This article is not a sermon, unless it be a sermon in stones. Belief in evolution demands the highest ideals in conduct; it bears directly on our daily "mores"—our usages, fashions, customs, and behavior. Belief in evolution and faith in Christianity are by no means incompatible; one can be both evolutionist and Christian.*

EVOLUTION is challenged to-day by many good and well-meaning people, at once as an enemy of religion, as the cause of the rise of animalism, and as the chief cause of decadence in conduct.

I am informed by the bishop of the Episcopal diocese of Arizona that before a crowded house in Texas William Jennings Bryan recently classed me with Voltaire, Thomas Paine, and Robert Ingersoll as an atheist, because I believe in Evolution. Nearer home,

John Roach Straton posted this charge on the front of Calvary Baptist Church: "Is the American Museum of Natural History Misspending the Taxpayers' Money and Poisoning the Minds of the School Children with False and Bestial Theories of Evolution? Should not the Bible be Displayed in the Museum as well as Old Musty Bones?" I immediately sent to Doctor Straton the following letter:

Such a notice is very serious indeed. I am quite mindful of the Scriptural injunction which, as I recall it at the present moment, reads: "Whoso shall offend one of these little ones which believe in me, it were better for him that a millstone were hanged about his neck and that he were drowned in the depth of the sea." The American Museum is visited annually by hundreds of thousands of children, and its lectures are attended altogether by millions of children. No one can point out either in the exhibition halls of the American Museum or in its lectures a single untruthful statement, because the lectures and the exhibition halls do not set forth theories, but what may be actually observed in Nature by an intelligent child, if the opportunity is afforded. If you will examine carefully an exhibit in the Hall of the Age of Man you will see that it demonstrates

very clearly not that man has descended from the monkeys or from the apes, but that he has a long and independent line of ascent of his own.

It is not for man to question his Creator, but to accept every act of creation as the Act of God.

If there is in the world anything that I love it is the children, and anything that I reverence it is the beauty of the child soul—the kind of pristine, natural beauty which Wordsworth portrays in his "Ode on the Intimations of Immortality."

I am myself, or endeavor to be, a consistent evolutionist; I also undertake the far more difficult task of being a consistent Christian. I believe in the past evolution of man and in the present evolution of man, and I am hopeful of the future evolution of man, unless his conduct leads to his extinction, as it is now doing in many parts of the world.

As summed up in my rapidly written reply to Bryan's article in the Sunday *Times* of February 26, 1922, this simple, direct teaching of Nature is full of moral and spiritual force, if we keep the element of human opinion out of it:

*The moral principle inherent in evolution is that nothing can be gained in this world without an effort; the ethical principle inherent in evolution is that only the best has the right to survive; the spiritual principle in evolution is the evidence of beauty, of order, and of design in the daily myriad of miracles to which we owe our existence.*

I believe that not alone our physical but our moral, our intellectual, even our spiritual, powers have ascended through a long, slow, upward movement, which we partially express in the utterly inadequate word *Evolution;* Bergson's term *Creative Evolution* is far nearer the actual truth, because through life-long researches in paleontology I have come in my own mind to define evolution as a *continuous creation of life fitted to a continuously changing world.* This definition is made, not from reading the works of other biologists, but from my own close observations on animal and human evolution.

The creative evolution process actually con-

sists of the incessant creation of new forms and combinations of energy in the animal world, of new means of enjoying the rest of the universe both in the animal and in the human world, of new moral, spiritual, and intellectual powers gained sometimes slowly, sometimes suddenly. This is the outstanding result of forty years of my own observation. Evolution as a greater or less development of the existing powers of a plant or animal is the least difficult part to comprehend; the creation of new powers and faculties, especially of the human mind and spirit, is the most difficult to comprehend—in fact, the incomprehensible part of the whole process.

Our knowledge of the physical evolution of man, of his bodily structure, has advanced so rapidly that the end is almost in sight; namely, of the whole Age of Man of the last 500,000 years and the physical structure of man in the preceding Tertiary period. But the physical structure of man is a relatively simple problem in comparative anatomy and paleontology. It is not his physical anatomy which makes man human; it is his moral, intellec-

tual, and spiritual nature alone that makes him a member of the order *Primates* of the great Swedish naturalist, Linnæus.

So far as we can observe, the foundations of the moral nature of man were apparently laid in the subhuman stages, for certainly three of the cardinal human virtues—such as protection of the family, observance of the rights of others, including the rights of property, and union for collective rights—exist in a very high degree in many of the living primates, and probably existed as well in those as yet entirely unknown primates of the Tertiary period from which we are descended.

Regarding the intellectual evolution of man, the case immediately becomes more difficult. I was never so impressed with this fact as in my journeys among the former habitations of the cavemen in northern Italy, France, and Spain. I soon conceived a great admiration for these men because of their undoubted intellectual powers as observed not only in the superb development of the brain, but also in the high observational and artistic powers manifested in their art. I am perhaps

more proud of having helped to redeem the character of the cavemen than of any other single achievement of mine in the field of anthropology. The caveman bore, and still bears, an evil reputation of being a brute, because few people recognize that during the long cave period there were two entirely different types of man—one of an extremely ancient lower order, known as the Neanderthal race of hunters, suddenly succeeded in Europe by one of much higher order, known as the Crô-Magnon race of artists. The creation of this man of a higher order, with his moral, spiritual, and intellectual powers, is utterly incomprehensible as purely a process of the survival of the fittest.

We have every reason to believe that the men of the Crô-Magnon race who dominated northern Spain, France, and England between twenty-five and forty thousand years ago could compete in the art schools with any of the animal sculptors and painters of our day, and judging from the size and form of the brain of the Crô-Magnon youth I believe that they could enter any branch of the intellectual life

of to-day on equal, if not superior, terms. We know that they were mystical and superstitious and believed in magic, and were, in a primitive sense, religious. We know that in their art they were absolutely truthful and sincere. We know that they were reverent because in the thousands of drawings, etchings, and paintings they have left not a single irreverent one has been discovered, except in some of their representations of man. We know that they were conscientious because their drawing has the marks of fidelity to truth, to the last detail. We know that they loved beauty because they rapidly attained the full expression of beauty in the representations of animal life.

This emergence of the soul and of the mind of man prior to the poetry, the art, the literature, the philosophy, and even the science of early civilization is what I refer to as the creative element in evolution. The case of the Crô-Magnons is by no means unique. The men who wrote the epics of Homer had barely emerged from the northern forests. An Eskimo boy brought by Peary from the arctic region,

educated by a tribe of primitive people who count only up to the number 5, competes successfully in one of our public schools. Two Peruvian brothers taken directly out of the forests attain high rank in a parochial school. We observe that intelligence dawned slowly in the mind of man, but we cannot observe why a mathematical mind arose before there was any science of numbers.

### TRIUMPH OF OBSERVATION; FAILURE OF SPECULATION

The genesis of the intellectual and spiritual powers of man through the Lamarck-Spencer hypothesis of use and disuse fails as entirely as does the survival of the fittest or any other useful theory of genesis of the mind and of the soul. All the Lamarckian and purely materialistic hypotheses which were current when I was studying philosophy and biology in 1876 have fallen one by one by the wayside, and the origin of the soul of man is more of a mystery than ever. All we know is that it did not come in an instant of time, as Bryan believes, but was an age-long process.

Every day during my forty-eight years' observation and philosophy of Nature and of the biology of man I become more of a *naturalist*, less of a scientist, still less of a rationalist. What has been the fate of the rationalism of 1876 or of the materialism of that day or of the other "isms" which were held up to our tender student minds as bogies? I remember the catch phrases: as to materialism, for example:

"What is matter?"
"Never mind."
"What is mind?"
"No matter."
"What is the soul?"
"It is immaterial!"

Or as to the chemical nature of intellect: "The brain secretes thought as the liver secretes bile." Or as to the evolution of man —the parody:

There was an ape in days that were earlier,
Centuries passed and his hair became curlier,
Centuries more, and his thumb gave a twist
And he was a Man and a Positivist.

Or the squib on clericalism, Huxley's saying about the two chambers of the heart, referring to the resemblance of the bicuspid valve to the bishop's mitre: "We may always remember that the tricuspid valve is on the right side of the heart and the mitral valve on the *left*, because a bishop is never known to be in the right."

Both scientific and religious men have largely passed out of this critical, polemic, materialistic and mechanistic period of antagonism between religion and science, and Bryan's rôle is that of the grave-digger of fossil issues and controversies.

The truth is that both sides are far more humble and less cocksure than they were in the '70's. Human reason in the '70's, after having been kept indoors by the theologians for nearly ten centuries, was like a boy out of school—it knew no bounds; it was full of brisk confidence; it did not realize, as human reason does to-day, that Nature is superrational. We have all found that Nature is full of lurking surprises and contradictions in her methods. The bishops and clericals have

learned that so far from the world being anthropocentric, man seems to have been one of the last things thought of in creation.

No overconfident rationalist of 1876 dreamt of radiant energy as we know it now; no one can dream of biology as it will be fifty years hence when it is studied by physical methods. Rationalists are more humble now, because in the hunting-field of human thought the scientists have taken as many falls as the theologians; the honors are even in this regard.

### EVOLUTION AND MORALS

My great teacher Huxley felt the limitations of the human reason in defining himself as an agnostic or as an honest doubter. His system of teaching evolution and morals was diametrically opposed to that of Herbert Spencer, as was also his attitude toward religion and the Bible.

Brought up, as I was, by a devout Christian mother, Huxley retained his love and reverence for the English Bible:

> When the great mass of the English people declare that they want to have the children in the

elementary schools taught the Bible, and when it was plain from the terms of the Act that it was intended that such Bible-reading should be permitted, unless good cause for prohibiting it could be shown, I do not see what reason there is for opposing that wish. Certainly, I, individually, could with no shadow of consistency oppose the teaching of the children of other people *that which my own children are taught to do.* . . .

I have always been strongly in favor of secular education, in the sense of education without theology; but I must confess I have been no less seriously perplexed to know by what practical measures *the religious feeling, which is the essential basis of conduct,* was to be kept up, in the present utterly chaotic state of opinion, without the use of the Bible. [Italics my own.]

For these reasons I regard Huxley's influence on Conduct as far more lasting than that of Spencer. While in 1879 the works of Herbert Spencer were regarded with reverence and awe and were read by thousands of students like a new revelation of truth, the Herbert Spencer system has crumbled so far as it depended on pure reason, so far as it departed from direct methods of observation. Ernst Haeckel was the great proponent of Darwinism on the Continent of Europe, and the chief

elements of his theories of the origin and evolution of man have crumbled like those of Spencer. Darwin as an observer of Nature is still strong and will always be our master; so far as his works were drawn directly from Nature they are truer and more wonderful than ever, while the entirely speculative or rationalistic side of Darwin's philosophy has largely failed. Huxley, from 1863 until his death in 1895 the boldest proponent of the evolution of man among English-speaking people, was always a very cautious thinker, overcautious in his theories as to the evolution of man.

Huxley never committed himself to the survival-of-the-fittest theory as to the origin of species as adequate, and in his last public utterance, the Romanes Lecture, he declared that we could not derive the moral or spiritual evolution of man from Darwin's hypothesis of the struggle for existence. In this declaration, which has been quoted so often as divorcing evolution from conduct, I do not for a moment agree with my great master of 1879–80. We know far more about the actual evolution process than Huxley did, because in his time

the creative element in evolution had not been discovered.

A challenge to evolution now is a challenge to Nature itself, and Nature is the oldest and wisest instructor of both minds and morals. Cicero observed, "I turn to Nature as I would to God," and this is the underlying thought of modern conceptions of evolution in relation to conduct; great religious thinkers, like St. Augustine, Dante, Charles Kingsley, Ralph Waldo Emerson, have from time to time reminded us of this chief doctrine of Cicero; Kingsley, who followed in the steps of Cicero, St. Augustine, and Dante, declared that there could be no antithesis between the order of Nature and true religion.

. . . . . .

It may be said without scientific or religious prejudice that the world-wide loss of the older religious and Biblical foundation of morals has been one of the chief causes of human decadence in conduct, in literature, and in art. This, however, is partly due to a complete misunderstanding of creative evolution, which is a process of ascent, not of descent.

Whereas a little knowledge of evolution has proved to be a very dangerous thing in human history, a more profound knowledge of evolution makes it a very safe thing for the present and future progress of the human race. Lest we become too serious, let us refer to the immortal Pickwick. We recall where Sam Weller speaks of the fascination of widows he says: "A little widow is a dangerous thing." I am often reminded of this when I see the first effects of science and of the principle of evolution not only on the student mind, but on the mind of the man of the street and on the mind of the man of letters.

As to Nature's firm foundations for religion and morals in our own day, may I refer to the bearing which the new creative idea of evolution has upon the old teleological argument for Design as set forth in Paley's "Evidences," the standard text-book of my student days? Huxley once told me that Paley's argument for the direct handiwork of the Creator was so logically, so ingeniously and convincingly written that he always kept it at his bedside for last reading at night. So long as the chance

or fortuitous hypothesis of adaptation reigned Paley's argument for the existence of God was set aside, but our more profound knowledge of creative evolution, gained by direct observation of Nature, leaves Paley's argument just as strong as it ever was. Paley's "Evidences" may be challenged now no more effectively than it could be challenged in 1858.

"*O tempora, O mores,*" exclaimed Cicero when he was outraged with the conduct of life, and particularly with the political life of Rome; Horace at the same period lamented the loss of the ancient virtues. Times have changed little since 80 B. C. and both man and Nature are exactly the same now as they were then.

Bryan and Straton as public mentors endeavor to take the place of Cicero and Horace, without any of their literary genius or truth-loving spirit; they are the demagogues of modern conduct. We are told that Nature and Evolution are inconsistent with Religion and are undermining Conduct. Let us boldly declare that freedom of thought has led to license of thought and expression; let us lament the

disuse of the Bible in its eternal influence on conduct; but let us not for a moment imagine that belief in evolution or any other great truth of Nature releases us from the highest ideals of conduct. Let us rather put every one of the daily practical problems of conduct to *the crucial test of its bearing on human progress and on the future of our race and of human society.*

What, for example, will be the influence on human progress of our attitude on Religion, on Individualism, on Marriage, on Fashion, on our Intellectual and Spiritual Life, on Government, on Freud's Psychology, on the Stage and the Movies, on Problem Literature, on the daily newspaper? I can prove that each of these current questions and problems bears upon the evolution of our race.

As for the press, it may interest my readers to know that I invariably study the daily papers from the standpoint of human evolution, because I hold that the press and the movies are by far the most potent influences upon conduct in America at the present time.

The editorial influence of the press is al-

most uniformly good so far as domestic morals are concerned. The news-column influence of the press is partly bad but mostly good, because publicity tends on the whole to elevate morals. The advertising pages of the press are divided in their influence: health advertisements are to the good; feminine-fashion advertisements are mostly to the bad. The sum of press influence is morally good but intellectually bad, because it creates what I call the jazz mind and a disproportionate sense of relative values.

| *New York:* | *Fashion* | *Athletics* | *Political Misconduct* | *Politics—Domestic* | *Stage and Movies* |
|---|---|---|---|---|---|
| World..... | 7,589 | 8,272 | 5,757 | 2,889 | 2,352 |
| Times..... | 29,317 | 11,850 | 6,070 | 9,148 | 5,027 |
| American.. | 438 | 7,103 | 4,692 | 1,834 | 3,294 |
| | 37,344 | 27,225 | 16,519 | 13,871 | 10,673 |

| *New York:* | *Private Misconduct* | *Politics—Foreign* | *Education* | *Food and Health* | *Religion* |
|---|---|---|---|---|---|
| World..... | 3,531 | 2,745 | 1,409 | 932 | 1,037 |
| Times..... | 2,730 | 4,774 | 956 | 656 | 1,043 |
| American.. | 3,613 | 955 | 57 | 692 | 182 |
| | 9,874 | 8,474 | 2,422 | 2,280 | 2,262 |

With the aid of the School of Journalism of Columbia University I made a quantity survey of the amount of space devoted by three great newspapers of the day to ten principal subjects for the month of February, 1924. The measurements are made in linear columns, twenty-one inches to the column, and advertisements are included because advertisements dominate fashions, as shown in the table on the previous page. All of these headlined subjects are related to our daily life and conduct in a manner we may not be conscious of.

It is observed in the above table that the press treats in descending order of importance the following subjects which daily affect our lives: Fashion, Athletics, Political Misconduct, Politics, national and local (*i. e.*, government), the Stage and the Movies, Private Misconduct (crime, etc.), Foreign Politics, Education, Food and Health, Religion.

Small wonder that ours is not a religious age; small wonder that education, which Lincoln regarded as the very first concern in the conduct of the State, is little in our thought;

small wonder that the average young American is convinced of prevailing political misconduct; small wonder the craze for athletics. It is a question whether the fine influence on conduct of the editorial writer is not more than offset by the man who arranges the news and advertising columns.

And what is our own attitude on all these daily problems of our life? Is it constructive or creative? Does it tend to human ascent? If our conduct works well now how will it work on our descendants a century hence? Are we living in such a way as to have descendants? This is the very newest aspect of the human-evolution problem, namely, what will be the bearing of the present-day attitude toward daily practical questions of conduct on the future of our race.

It is not immediately obvious, but a moment's reflection shows that our future is inevitably bound by daily practical questions of conduct. For example, we may smile at prohibition, but when we look at it from the standpoint of the future progress of man we become serious; every drinking man I knew

in college in 1876 and every drinking student of mine up to the year 1890 has paid the death penalty, and they were all fine men who could hardly be spared. As the great English surgeon, Sir Andrew Clarke, said to one of his wayward patients: "Nature forgives but never forgets."

It may amuse us to read of individualistic young women abandoning their husbands and their children, but when we Americans learn that as a race we are rapidly dying out our amusement ceases. In this connection let us read the Very Reverend William Ralph Inge, Dean of St. Paul's, called "gloomy" because he has the courage to tell the truth; not really gloomy, he is at once the leading moral and scientific preacher of our times.

I am not gloomy either, but as a consistent evolutionist I desire to see the conduct of the young men and women of America so governed by religion and by evolution that they will evolve in the right direction.

# V

## CREDO OF A NATURALIST

*"The purpose of science is to develop, without prejudice or preconception of any kind, a knowledge of the facts, the laws, and the processes of nature. The even more important task of religion, on the other hand, is to develop the conscience, the ideals, and the aspirations of mankind. Each of these two activities represents a deep and vital function of the soul of man, and both are necessary for the life, the progress, and the happiness of the human race."—From a Credo signed by fifteen eminent scientists.*

IN 1876, when I began my philosophic and scientific studies in Princeton, the long struggle between Supernaturalism and Naturalism was culminating in a complete victory for Naturalism. In England Mill and Huxley had won the battle for freedom of the human reason; in Germany along with Haeckel's battles for Darwin there had sprung up an extreme form of materialism; in France the mechanistic teaching of Descartes was revived. The pendulum of thought had swung

completely away from the teleological or purposive interpretation of Nature that had entirely dominated the natural science of the first half of the century.

The whole rising generation of naturalists dropped the Bible and eagerly read Herbert Spencer, whose philosophy and biology became a new gospel; the successive editions and translations of his works were second only to those of Darwin. Among American students Spencer was still supreme as late as 1891 when I came to Columbia. As for his influence among laymen, I well remember Judge Carter, of Fort Bridger, Wyoming, and his shrine of Spencer's complete writings, encased with a photograph of the great closet philosopher. Now Spencer has become merely an historic figure in the history of natural philosophy; he is no longer a living force.

In the recent writings of two of the leading psychologists and philosophers of America, Dewey, of Columbia, and McDougall, of Harvard, it appears that psychologists have lost touch with the soul. Contrasting the older and orthodox psychology with the present,

Dewey remarks that "the soul or mind or consciousness was thought of as self-contained and self-enclosed. Now in the career of an individual if it is regarded as complete in itself instincts clearly come before habits. Generalize this individualistic view, and we have an assumption that all customs, all significant episodes in the life of individuals can be carried directly back to the operation of instincts. . . . Only the hold of a traditional conception of the singleness and simplicity of soul and self blinds us to perceiving what they mean: the relative fluidity and diversity of the constituents of selfhood." [1]

McDougall is still more brief with the soul; he says that "ancient psychology accepted the soul, and was chiefly concerned to distinguish the various functions of the soul and to assign them seats in the various parts of the body. In the modern period this type developed into what is generally called 'faculty psychology.' . . . Both the older and the later form of faculty psychology have long been discredited, even though it be admitted

[1] John Dewey, "Human Nature and Conduct" (1922), pp. 94, 138.

that the conception of a soul or mind endowed with certain most fundamental faculties is one that we cannot wholly dispense with." [1]

From Dewey and McDougall, I turned to my friend Cattell, asking him if his fellow psychologists had really lost the soul. He replied: "I can talk more intelligently about any other subject than the soul. *It is well known that psychology lost its soul long ago and is said now to be losing its mind.* You should inquire of Descartes and the Catholic Church; it is a good subject for a paleontologist like yourself!"

Hunting in the chambers of my memory for an explanation of this loss of the soul by psychologists, I asked Cattell if he recalled the sensation made by a paper entitled "The Normal Knee-Jerk." He reminded me that this was the opening article in Stanley Hall's new *Journal of Psychology*, started in the year 1887. This article was the curtain-raiser for the long-ensuing quest of the spirit of man by laboratory methods, mechanical, chemical, analytical, that has resulted in psychol-

[1] William McDougall, "Outline of Psychology" (1924), pp. 12, 13.

ogy wandering through the mazes of brain and nerve and sense-organ physiology, in which all vision of the soul has finally been lost.

It would be difficult to fix the date for the return swing of the pendulum away from purely materialistic and mechanistic interpretations toward spiritual and teleological interpretations not in the least resembling the old but pointing toward new forms of belief and of faith in which there is less schism between the teachings of Nature and the aspirations of Religion. The World War certainly accelerated this spiritual movement, because it engendered a horror of mechanism and materialism and placed a new emphasis upon the spiritual basis of conduct rather than upon the mechanistic. The movement was not led, as might have been expected, by biologists, still less by psychologists.

It appears that we may turn to physicists and physiologists for a rediscovery of the soul and the spiritual nature of man. Robert A. Millikan, the last Nobel Prize man in physics, tells us in 1921 that from his point of view

there are only two ideas or beliefs upon which the weal or woe of the race depends and that the *most important thing in the world is a belief in the reality of moral and spiritual values.* "It was because we lost that belief that the World War came, and if we do not now find a way to regain and strengthen that belief, then science is of no value. But, on the other hand, it is also true that even with that belief there is little hope of progress except through its twin sister, only second in importance, namely, belief in the spirit and the method of Galileo, of Newton, of Faraday, and of the other great builders of this modern scientific age,—this age of the understanding and the control of nature, upon which let us hope we are just entering." [1]

Long before 1920 the *rapprochement* between religion and science was initiated in Germany by Rudolf Eucken, of Jena, who won the Nobel Prize in literature in 1908. Eucken contended that "the age must win for itself an essentially new form of Christianity answering to that phase of the Spiritual Life

[1] "The Significance of Radium," *Science*, July, 1921.

to which the world's historical development has led us. . . . The more clearly we realize that if Reason does not reside in the whole structure of the universe, it cannot be found in any single spot of it,—the sooner shall we be entitled to hope that the religious problem will win back the passionate enthusiasm that is its due, and that our work on it will no longer assume the attitude of speculative reflection, but pass into the constructive action of a forward policy." ("Christianity and the New Idealism," 1909.)

More recently (1921) Walter Rathenau gave the noblest expression of this spirit:

Yet as surely as we know that the awakening soul is the divine sanctuary for which we live and are, that love is the redeemer who will liberate our innermost good and will weld us to a higher unity, just so surely do we recognize in the inevitable world-struggle of mechanization the one essential—the will toward unity. In so far as we oppose to mechanization the token at which it pales, namely, transcendental philosophy, spiritual devotion, faith in the absolute; in so far as we illuminate the true nature of mechanization, reaching out to the secret core of the will to unity—so far shall mechanization be dethroned, and constrained

to service. . . . Woe to the race and to its future should it remain deaf to the voice of conscience; should it still be petrified in materialistic apathy; should it rest content with tinsel; should it submit to the bondage of selfishness and hate. We are not here for the sake of possessions, nor for the sake of power, nor for the sake of happiness; we are here that we may elucidate the divine elements in the human spirit. ("Was Wird Werden," 1921.)

There is more warmth in the rediscovery of the soul by Rathenau than there is in the chilling counsel on conduct by our psychologist Dewey, who says that "a morals based on study of human nature instead of upon disregard for it would find the facts of man continuous with those of the rest of nature, and would thereby ally ethics with physics and biology. It would find the nature and activities of one person coterminous with those of other human beings, and therefore link ethics with the study of history, sociology, law, and economics. . . . Until the integrity of morals with human nature and of both with the environment is recognized, we shall be deprived of the aid of past experience to

cope with the most acute and deep problems of life." [1]

In England, religious as well as scientific opinion is still widely divided. The *rapprochement* between theology and science probably began in the spiritual emotions aroused in all minds during the World War, but this movement first took outward expression at the Cardiff meeting of the British Association of 1920 in an enlightened sermon by Reverend E. W. Barnes, distinguished mathematician, Fellow of the Royal Society, and Canon of Westminster, now Bishop of Birmingham. As reported in *Nature* of September 2, 1920, "not for a long time has such a conciliatory attitude been presented to men of science by a leader in the Church as is represented by Canon Barnes's address. The position taken up in it is one upon which the two standards of science and religion can be placed side by side to display to the world their unity of purpose. For Science and Religion are twin sisters, each studying her own sacred book of

[1] John Dewey, "Evolution and the Ethical Ideal." Univ. of Cal. *Chronicle*, January, 1924, p. 27.

God and building a structure which remains sure only when established upon the foundation of truth. . . . Whatever the end may be, we are urged to the quest by that something within ourselves which has produced from a primitive ancestry the noblest types of intellectual man, and regards evolution, not as a finite, but as an infinite process of development of spiritual as well as of physical life." The editor of *Nature* in reviewing the epoch-making Conference of Modern Churchmen at Oxford at the end of last August, quotes the scientific theologian Harnack: "In spite of intense effort our modern thinkers have not succeeded in developing a satisfactory system of ethics and one corresponding to our deepest needs on the basis of monism. They will never succeed in doing so."

From England also, in the Gifford Lectures of 1922, comes C. Lloyd Morgan's "Emergent Evolution." Morgan, one of the most eminent pupils of Huxley, is at once experimental biologist, psychologist, natural philosopher. His volume reflects his culminating life-thought, which began in youthful conversa-

tion with Huxley. Huxley asked what the young student Morgan understood by "innate powers" and Morgan replied: "May not an internal formative tendency be as distinctly recognized as an internal conservative tendency?" Whereas the Catholic protagonist Mivart, and subsequently the great naturalist Wallace, dwelt upon the idea of the leap or sudden advance from the animal to the human state of mind and of soul, Huxley in this conversation dwelt upon the absence of any leap, upon continuity in both brain and mind from the animal state to the human stage. Morgan asked on what grounds Huxley spoke of brain as an antecedent of thought and why one might not follow Spinoza in regarding thought and brain as alike playing their parts in causing the evolution of man. In conclusion Huxley dismissed the neophyte Morgan with the encouraging words, "You might well make all this a special field of inquiry," and the outcome of this kindly advice is the constructive scheme of evolution to which Morgan has devoted his life, as summed up in his volume "Emergent Evolution." It

differs from Bergson's famous work, "Creative Evolution," in containing the purposive principle that "leads upward toward God, as directive Activity within a scheme which aims at constructive consistency." Morgan continues that there may be something more in the heart of events than efficiency, something more than causation, and for this he takes the risk of "the higher acknowledgment, the Creative Source of evolution—this is God." Of the relation of brain and thought he says that the brain is *par excellence* the organ of the guidance of behavior; for example, the form and color are contained in the rainbow, but "it is the paradox of beauty that its expressiveness belongs to the beautiful thing itself and yet would not be there except for the mind." If the idealist assert that color lives only at top, *i. e.*, in the mind, irrespective of physical correlates in the organism; or if the realist assert that it lives only at bottom, *i. e.*, in the thing, irrespective of psychical correlates in the organism, Morgan submits that each goes beyond the evidence. Passing on from this principle of pure

causation Morgan thus sums up his philosophy:

> Hence it is taken for granted as scarcely open to question by practical folk, that mind is pre-eminently a cause of certain noteworthy changes in the face of nature, and is in a very special sense active,—so much so that the activity we feel, when through exercise of the will we are ourselves causes, best illustrates what is meant by causal activity. Carry this a stage further, lifting it to a higher plane of thought, and we have the widely accepted belief that ultimately all observable change is due to some form of Spiritual Activity.

The timeliness of Morgan's search of the spiritual is that it springs from the experience and observation of a highly trained zoologist and experimental psychologist—certainly a peer in his field of research. It is not the perishable closet philosophy of Herbert Spencer nor the brilliant abstract thought of Henri Bergson, thought not based on personal experience or experiment. In reviewing his position Morgan states that "emergent evolution works upwards from matter, through life, to consciousness which attains in man its highest reflective or supra-reflective level. It accepts

the 'more' at each ascending stage as that which is given, and accepts it to the full. The most subtle appreciation of the artist or the poet, the highest aspiration of the saint, are no less accepted than the blossom of the water-lily, the crystalline fabric of snow-flake, or the minute structure of the atom. Emergent evolution urges that the 'more' of any given stage, even the highest, involves the 'less' of the stages which were precedent to it and continue to coexist with it." He feels that we may acknowledge, on the one hand, a physical world that we observe and study through our senses and, on the other hand, an immaterial Source of all changes therein; namely, God, on Whom all evolutionary processes ultimately depend. "In my belief in God, on Whom all things depend, I am certainly not alone. I would fain not stand alone in combining with this belief, and all that it entails, that full and frank acceptance of the naturalistic interpretation of the world which is offered by emergent evolution."

In England again, Professor J. S. Haldane, eminent physiologist, in his essay, "Biology

and Religion," tells us that he cannot regard the mechanistic theory of life as tenable; that "it involves quite impossible assumptions and leads us nowhere in respect of the characteristic phenomena of life. Not only the newspapers, but also scientific men, continue to speak of the mechanism of life and heredity; I confess that such an expression has no meaning whatsoever to me. We cannot dispense with the distinctive conception of life. Let there be no mistake, however, about what this implies. It implies that the old conception of visible reality which Galileo and Newton set forth has broken down; and that there is no use in appealing to that conception in support of a mechanistic theory of life. Life would be unintelligible on that conception; but it is reality that science has to deal with, and not an ideal world of mechanism."

As to religion and conduct, Haldane adds: "We are the children of a materialistic age. We look for a soul consisting, if not of ordinary matter in the mechanical sense, yet of something which is only a thinly veiled imi-

tation of it. We look, also, for a similarly constituted God. Such entities can never be found. God is with us, in us, and everywhere around us, as Jesus taught. . . . If I thought that my country could get on equally well without churches I should not care what was taught in them. But I do not think so. We need to be constantly reminded of that spiritual reality which manifests itself in willing service of every kind, and without the perception of which our country would relapse into chaos."

American scientific and philosophic thought does not lead; it follows that of England and of Germany; also that of France, where since the World War there has been a spiritual and religious revival, although not, so far as the writer knows, in the minds of scientific men. However, the recent American spiritual movement did not come from abroad, but from the indignation aroused by the ignorant assaults of William Jennings Bryan on the evolution theory. In 1923 a statement was drawn up by thirty-five prominent Americans, among whom were fifteen eminent scientists, in-

cluding four mathematical physicists (Millikan, Pupin, Noyes, Birkoff), one astronomer (Campbell), seven biologists (Welch, Conklin, Coulter, Osborn, Merriam, Walcott, Mayo), two civil engineers (Carty, Dunn), one psychologist (Angell). This "Joint Statement upon the Relations of Science and Religion" is partly cited at the beginning of this article, and it concludes with the following sentence: "It is a sublime conception of God which is furnished by science, and one wholly consonant with the highest ideals of religion, when it represents Him as revealing Himself through inbreathing of life into its constituent matter, culminating in man with his spiritual nature and all his Godlike powers."

Many other eminent physicists, astronomers, biologists, and psychologists of America would naturally decline to subscribe to such a "credo of faith" as this, either because they are still sincerely convinced of the adequacy of the mechanistic theory of philosophy and of the psychologic creeds for the conduct of life, such as we have cited from Dewey and McDougall, or because they prefer to remain

in the perfectly consistent and defensible fortress of agnosticism erected by my old friend and teacher Huxley.

For my own part, I aided my friend Millikan in the wording of the joint statement of the thirty-five American religious leaders, scientists, and men of affairs, and, with the fourteen other scientists, I signed it because I am thoroughly convinced that the naturalist needs a credo or profession of his faith, even if this credo is very different from that drilled into his youthful mind and memory before the world entered into universal acceptance of the law of evolution.

I well remember the final address of a distinguished physiologist, Henry Newell Martin, also a pupil of Huxley, before the American Society of Naturalists in Boston, in which he said: "We science teachers have been making a great mistake; we have been developing the minds of our students and neglecting their souls." These words made a profound impression. I also recall a conversation with Huxley about the immortality of the soul and how reverently he approached this question.

The inscription on his gravestone, by Mrs. Huxley, is consistent with his agnostic attitude of mind:

> And if there be no meeting past the grave,
> If all is silence, darkness, yet 'tis rest;
> Be not afraid, ye waiting hearts that weep,
> For He still giveth His beloved sleep,
> And if an endless sleep He wills, so best!

Many of us are familiar with Huxley's tribute to the Bible, not only as one of the most exquisite in diction, but as one of the most profound in conviction that our age needs the lofty moral teachings of the Bible. Huxley himself was brought up with very strict religious training by a gifted mother who was a devout Sabbatarian. In the life of this revered teacher and in the lives of many friends and colleagues in various branches of science of similar religious training, I have observed qualities of truthfulness, of straightforwardness, of righteousness, of self-effacement that are ingrained in human character by the right kind of religious training and of which human character is defrauded by bigotry, by blind

adherence to dogma, and by the religious fanaticism of such men as Bryan and Straton.

These are the main ethical grounds for the credo of a naturalist. The philosophical and metaphysical grounds for a credo are of an entirely different order. They spring from the failure of materialism and of pure mechanism to give an interpretation of creative evolution that satisfies our reason. Our youthful confidence in the powers of reason has been shattered; like Icarus, we have taken our flight, and the wings of reason have ceased to sustain us.

If this thought of the impotence of human reason impresses the physicists, it impresses biologists still more cogently. Many biologists have entirely abandoned mechanistic theories of adaptation and have frankly revived the old purposive interpretation of Nature, in the guise of vitalism, or *élan vital.* I do not belong to any of these schools, but if I have made a single contribution to biology which I feel confident is permanent, it is the profession that living Nature is purposive; it is the profession that Democritus was wrong

in raising the hypothesis of fortuity, and that Aristotle was right in claiming that the order of living things as we know them precludes fortuity and demonstrates purpose.

This purpose pervades all Nature, from nebula to man. Herbert Spencer may call it the Unknowable; the naturalist, with Wordsworth, may call it the Wisdom and Spirit of the Universe.

> Wisdom and Spirit of the Universe!
> Thou Soul, that art the Eternity of thought
> And givest to forms and images a breath
> And everlasting motion!

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